



OBSERVATIONS ON THE MORPHOLOGY OF *CHAETOMORPHA AEREA* (DILLWYN) KÜTZING (CLADOPHORALES, CHLOROPHYTA), AT VISAKHAPATNAM COAST, INDIA

SUBHABRATA GHOSH and JAI PRAKASH KESHRI

Phycology Laboratory, Centre for Advanced Studies in Botany, The University of Burdwan, Golapbag, Burdwan-713104
West Bengal, India

E-mail: subhabrata_07@rediffmail.com ; jpkeshri@indiatimes.com

ABSTRACT

Chaetomorpha aerea (Dillwyn) Kützinger was collected from the costal parts of Visakhapatnam during a low tide condition. Morphological details of the taxon were investigated in detail. The present specimen was reported previously from various parts of the India but this is the first report of the taxon from the Visakhapatnam Coast, Andhra Pradesh.

KEY WORDS: *Chaetomorpha aerea*, India, Morphology, Visakhapatnam Coast

INTRODUCTION

Our knowledge of the algal wealth of the country is insufficient. In spite of a good quantum of work done on the marine algae from Indian coasts (Silva *et al.*, 1996; Krishnamurthy, 2000; Sahoo *et al.*, 2001; Zaidi *et al.*, 2001) our knowledge about the vegetation needs update. During an algal excursion to Visakhapatnam coast, the authors recorded *Chaetomorpha aerea* (Dillwyn) Kützinger from the intertidal coast of that area and studied its detailed morphology. *Chaetomorpha aerea* (Dillwyn) Kützinger is reported from various parts of the world [Balearic Islands (Rodríguez & Femenías, 1989), Baltic Sea (Nielsen *et al.*, 1995), Black Sea (Dimitrova-Konaklieva, 1981), Britain (Newton, 1931), Helgoland (Bartsch & Kuhlenskamp, 2000), Portugal (Ardré, 1970), Spain (Gorostiaga, *et al.*, 2004), Turkey (Taskin *et al.*, 2008); Atlantic Islands: Ascension (John *et al.*, 2004); North America: British Columbia (Mondragon & Mondragon, 2003), California (Silva, 1979); Central America: México (Pedroche *et al.*, 2005), Caribbean Islands: Tobago (Duncan & Lee Lum, 2006); South America: Argentina (Boraso de Zaixso, 2004); Africa (Gallardo *et al.*, 1993); South Africa (Leliaert & Coppejans, 2004); Indian Ocean Island: Diego Garcia Atoll (Silva *et al.*, 1996); Laccadive Islands (Silva *et al.*, 1996); South West Asia: Bangladesh (Silva *et al.*, 1996), Iran (Sohrabipour & Rabii, 1999), Pakistan (Silva *et al.*, 1996), Sri Lanka (Børgesen, 1936); Asia: Japan (Yoshida *et al.*,

1990); Korea (Lee & Kang, 2001); South East Asia: Philippines (Silva *et al.*, 1987), Vietnam (Pham-Hoáng, 1969); Australia and New Zealand: Lord Howe Island (Lewis, 1987); New Zealand (Adams, 1994), Pacific Islands: Easter Island (Santelices & Abbott, 1987), Hawaiian Island (Abbott & Huisman, 2004)].

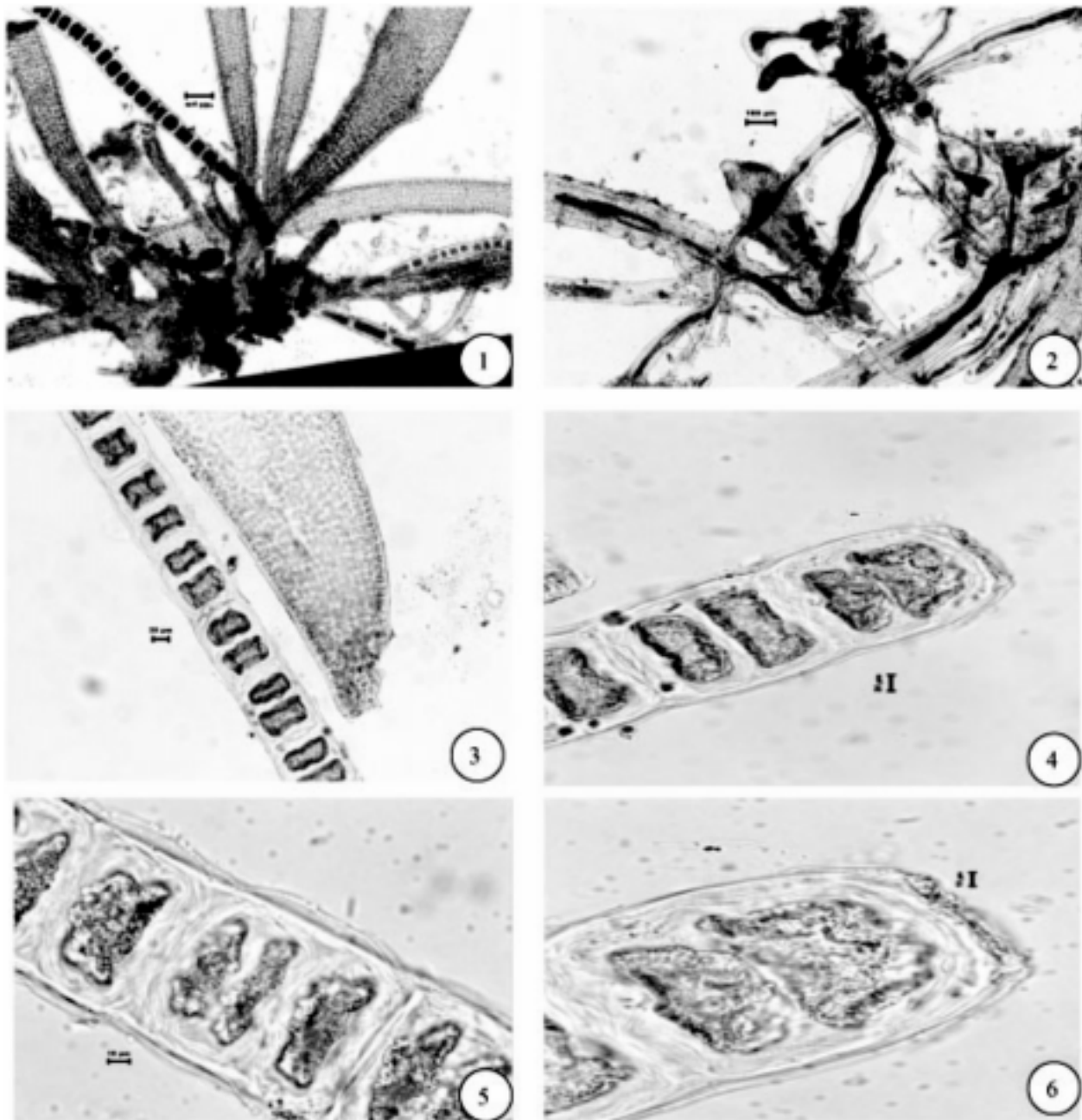
The above mentioned taxon is being reported from both east and west coasts (Krishnamurthy, 2000) of India as recorded by various workers: Gujarat (Patel & Gajaria, 1979); Maharashtra: Bombay (Børgesen, 1935; Untawale *et al.*, 1983); Tamilnadu (Jaysankar *et al.*, 1990; Kalimuthu *et al.*, 1992; Kaliaperumal *et al.*, 1992; Balakrishnan *et al.*, 1992; Jansi & Ramadhas, 2009); Lakshadweep (Silva *et al.*, 1996).

This is, however, the first documentation of the taxon from Visakhapatnam coast, Andhra Pradesh.

MATERIAL AND METHODS

Algal specimens were collected from the intertidal zone of Visakhapatnam coast during a low tide condition. Algal samples (Collection No. V 12, V 19, and V 26) were collected randomly. Field photographs with proper measurements were taken by using Nikon SLR camera. After removing adhering materials like sand particles, other derbies and epiphytes collected samples were preserved in 5% formalin solution made with marine water. All collected materials were kept in plastic bags and also in hard transparent

PLATE-I



Chaetomorpha aerea (Dillwyn) Kützinger

Fig.1. Filaments of *Chaetomorpha aerea* along with *Enteromorpha* sp., Fig. 2. Enlarged view of the basal portion, Fig. 3. Middle part of the filament, Fig. 4. Tip portion of the filament Fig. 5. Middle part of the filament in enlarged view showing lamellate cell wall nature Fig. 6. Tip portion of the filament in higher magnification

plastic containers with detailed field notes. Permanent slides were made from preserved samples. Morphoanatomical details were deduced from these slides. Digital photomicrographs were taken made from permanent slides using CARL ZEISS Axiostar plus transmitted-light microscope and AxioVision LE software version 4.8.2. Identifications were made following Kützing (1849) & Krishnamurthy (2000). All the collected preserved algal samples and permanent slides are stored for future study and reference purpose in Phycology Laboratory, The University Burdwan, West Bengal, India.

RESULTS AND DISCUSSION

Chaetomorpha aerea (Dillwyn) Kützing
(Plate: I, Fig. 1-6)

(Kützing, F. T, 1849, p. 379; Krishnamurthy, 2000, p.115, Fig. 23: C-I)

Filament unbranched, growing in flocks or communities attached to sand covered or bare rocky substratum, 2-3 cm in height, yellowish green in color. Cells cylindrical, apical cells 111.2-111.5 µm in length and 110.5-111.6 µm in breadth, middle cells 54.5-62.2 µm in length and 88.8-89.2 µm in breadth, basal cell much longer than the middle and upper one, showing its length 133.32-144.5 µm and breadth 55.50-58.8 µm, sheath 17-22.5 µm in thickness, sometimes lamellate in mature portion.

Burrow (1991) included *Chaetomorpha aerea* in *Chaetomorpha linum* (O.F. Müller) Kützing, but this move was not accepted by Silva *et al.* (1996). According to John *et al.* (2002) *C. aerea* and *C. linum* are probably the growth forms of the same taxon. After comparing with the descriptions by Kützing (1849), it is concluded that the observed specimens are smaller than the material described by him.

ACKNOWLEDGEMENTS

The authors are thankful to the Head of the Department of Botany, The University of Burdwan for providing laboratory facilities, to G. Mustafa for his suggestions, to Surajit Roy, Debjyoti Das and Kaushik Sarkar for their help in various occasions.

REFERENCES

- Abott, I.A. & Huisman, J.M. (2004). *Marine green and brown algae of the Hawaiian Islands*. Bishop Museum Press. Honolulu, pp. XI +259.
- Adams, N.M. (1994). *Seaweeds of New Zealand, An illustrated guide*. Canterbury University Press Christchurch, pp. [1-7], 8-360.
- André, F. (1970). Contribution à l'étude des algues marines du Portugal. I. La flore. Portugalia Acta Biologica sér. B, 10: 137-555.
- Balakrishnan, S., Ravichandran, M. & Kaliaperumal, N. (1992). Studies on the distribution and standing crop of algae of Muthupet, Tamil Nadu. *Seaweed Res. Utiln.*, 15: 63-68, 2 figs, 1 table.
- Bartsch, I. & Kuhlenskamp, R. (2000). The marine macroalgae of Helgoland (North Sea): an annotated list of records between 1845 & 1999. *Helgoland Mar. Res.*, 54: 160-189.
- Boraso de Zaixso, A. (2004). Chlorophyta marinas de la Argentina. *Historia Natural, Buenos Aires, Ser.*, 23: 95-119.
- Børgesen, F. (1935). A list of marine algae from Bombay. *Kong. Danske Vidensk. Selsk. Biolog. Meddel.*, 12(2): 64.
- Børgesen, F. (1936). Some marine algae from Ceylon. *Ceylon J. Sci.*, Section Botany, 12: 57-966.
- Burrows, E.M. (1991). *Seaweeds of British Isles. Volume 2. Chlorophyta*: London Natural History Museum Publications, pp. xi+ 238.
- Dimitrova-Konaklieva, S. D. (1981). Geographical analysis on the marine algae of Black-Sea in the Ahtopol area. *Phytology.*, 18: 22-35.
- Duncan, E.J. & Lee Lum, L.M. (2006). A checklist of the marine macro algae of the republic of Trinidad and Tobago. *Caribbean Marine Studies*, 7: 1-96.
- Gallardo, T., Gomez Garreta, A., Ribera, M.A., Cormaci, M., Furnari, G., Giaccone, G. & Boudouresque, C.F. (1993). *Cheek-list of Mediterranean Seaweeds, II Chlorophyceae*, *Bot. Mar.*, 36: 399-421.
- Gorostiaga, J.M., Santolaria, A., Secilla, A., Casares, C. & Díer, I. (2004). Check-list of the Basque coast Benthic algae (North of Spain). *Anales Jardin Botánico de Madrid.*, 61: 155-180.
- Jansi, M. & Ramadhas, V. (2009). Effect of Salinity and dissolved nutrients on the occurrence of some seaweed in Marakkudy estuary. *Ind. J. Mar. Sci.*, 38(4): 40-473.
- Jaysankar, R., Ramalingam, J.R. & Kaliapermal, N. (1990). Biochemical Composition of some green algae from Mandapam Coast. *Seaweed Res. Utiln.*, 12: 37-40.
- John, D.M. (2002). Order Cladophorales (=Siphonocladales). In: *Fresh water Algal Flora of the British Isles. Identification on guide to fresh water and terrestrial algae*. (eds.) John, D.M., Whitton, B.A. and Brook, A.J., Cambridge: Cambridge University Press, pp, 468-470.
- John, D.M., Prud'homme Van Reine, Lawson, W.F., Kostermans, G.W. & Price, J.H. (2004). A taxonomic and geographical catalogue of the seaweeds of western coast of Africa and adjust islands. *Beih. Z. Nova Hedwigia*, 127: 1-339, 1 fig.
- Kaliaperumal, N., Kalimuthu, S., Muniyandi, K., Ramalingam, J.R., Chennubhotla, V.S.K., Rama Rao, K., Subha Rao, P.V., Thomas, P.C., Zaidi, S.H. & Subbaramaiah, K. (1992). Seaweed Resources of Tamil Nadu coast: Sector III Valinokkam-Kilakkarai. *Seaweed Res. Utiln.*, 15: 11-14.
- Kalimuthu, S., Kaliaperumal, N. & Ramalingam, J.R. (1992). Distribution and seasonal changes of marine algal flora from seven localities around Mandapam. *Seaweed Res. Utiln.*, 16: 155-160.

- Krishnamurthy, V. (2000). *Algae of India and Neighbouring countries Chlorophycota*. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi, p. 210.
- Kützing, F.T. (1849). *Species Algarum*. Lipsiae [Leipzig]: F.A. Brockhaus. p [I] vi, [1] – 922.
- Lee, Y. & Kang, S. (2001). *A catalogue of the Seaweeds in Korea*. Cheju National University Press. Jeju, p. [8], 1-662.
- Leliaert, F. & Coppejans, E. (2004). Crystalline cell inclusions: a new diagnostic character in the Cladophoraceae (Chlorophyta). *Phycologia*, 43: 189-203.
- Lewis, J.A. (1987). *Checklist and bibliography of benthic macroalgae recorded from northern Australia* ÉÉÉ. *Chlorophyta*. Department of Defence. Defence Science and Technology Organization. Materials Research laboratories, Melbourne, Victoria, Report-MRI-R-1063. p. 1-56.
- Mondragon, J. & Mondragon, J. (2003). *Seaweeds of the Pacific Coast, Common Marine algae from Alaska to Baja California*. Monterey, California: Sea Challengers. p- IV, 5-97.
- Newton, L. (1931). *A handbook of the British seaweeds*. British Museum (Natural History), London. pp.XYÝÝ+478.
- Nielsen, R., Kristiansen, A., Mathiesen, L & Mathiesen, H. (1995). Distributional index of the benthic marine macroalgae of the Baltic Sea area. *Acta Botanica Fennica*, 155: 1-70.
- Oza, R.M. & Zaidi, S.H. (2001). *A revised checklist of Indian Marine Algae*. CSMCRI, Bhavnagar, p. 196.
- Patel, R.J. & Gajaria, S.C. (1979). Cytotaxonomical studies of some members of Cladophorales from Gujarat, India, *Chaetomorpha*. International Symposium on Marine Algae of the Indian Ocean Region. Bhavnagar India. p.12. (Abstr.).
- Pedroche, F.F., Silva P.C. Aguilar–Rosas, L.E., Dreckman, K.M. & Anguilar–Rosas, R. (2005). *Catalogo de las algas marines bentonicas del pacific de Mexico .I. Chlorophycota.*, Ensenada, Mexico: Universidad Autonoma de Baja California, pp. i-viii, 17-146.
- Pham-Hoáng, H. (1969). Rong biên Việt Nam. Marine algae of South Vietnam, Saigon, pp. (VI+) 558, 67+224+88+119.
- Rodríguez y Femenías, J.J. (1989).Algae de las Baleares. *Anales Soc. Esp. Hist. Nat.*, 18: 199-274.
- Sahoo, D., Nivedita & Debasish (2001). *Seaweeds of Indian coast*. A.P.H. Publishing Corporation, New Delhi. p. 283.
- Santelices, B. & Abott, I.A. (1987). Geographical and marine isolation: an assessment of the marine algae of Ester Island. *Pacific Sci.*, 41: 1-20.
- Silva, P.C. (1979). The benthic algal flora of central San Francisco Bay. In: San Francisco Bay the Urbanized Estuary, (eds. Conomos, T.J.) San Francisco: pacific Division, American Association for the advancement of science. pp. 287-345.
- Silva, P.C., Meñez, E.G. & Moe, R.L. (1987). Catalog of the benthic marine algae of the Philippines. *Smithsonian Contributions of Marine Sciences* 27: [i-ii] iii-iv, 1-179.
- Silva, P.C., Basson, P.W. & Moe, R.L. (1996). Catalogue of the benthic marine algae of the Indian Ocean, University of California Publications in Botany 79: 1-1259.
- Sobrabipour, J. & Rabii, R. (1999). A list of marine algae of seashores of Persian Gulf and Oman Sea in the Hormozgan Province. *Iran. J. Bot.*, 8(1): 131-162.
- Taskin, E., Öztüük, M., Kurt, O. & Öztürk, M. (2008). *The Check list of the marine algae of Turkey*. Manisa, Turkey: Eeem Kirtasiye, pp. [i-ii]-[1]-87.
- Untawale, A.G., Dhargalkar, A.K. & Agadi, U.V. (1983). List of Marine algae from India, Goa, National Institute of Oceanography (iii), p. 42.
- Yoshida, T., Nakajima, Y. & Nakata, Y. (1990). Check–List of Marine algae of Japan (revised in 1990). *Japanese J. Phycol.*, 38: 269-320.